Latham Park - Preliminary Flood Analysis

Preliminary Report prepared by Planning & Engineering Section, Stormwater Management Division, City of Greensboro - August 2, 2001

(Edited September 29, 2004 in Response to Public Inquiry from Latham Park Stream and Sanitary Rehabilitation Project Informational Meeting)

Objectives

1. To model the water surface profiles of North Buffalo Creek along the Latham Park area for a range of flood flows (2-year to 500-year recurrence intervals).
2. Evaluate the water surface profiles and determine (potential) options for reducing the flood stage in this area.

Background

The Latham Park area along North Buffalo Creek between Wendover Avenue and Elm Street has experienced historical flooding problems as much of the park and surrounding area is located in or near a FEMA-regulatory floodplain. Approximately 25 homes (mostly pre-FIRM structures) on Latham Rd are in the FEMA Special Flood Hazard Area per the Flood Insurance Rate Map and a number of these structures (and/or their respective properties) have been flooded to some degree in the past. Latham Road, Cridland Road, Hammel, and Meadowbrook Terrace are periodically flooded. The FEMA Flood Insurance Study (FIS) profiles indicate approximately a 1.25 foot change in water surface elevation at the Elm Street bridge and a 0.5 foot change at the Cridland bridge for the 50-year and 100-year events, respectively. The 10-year event is shown to overtop the Cridland bridge and experiences approximately a 0.8 foot drop in water surface elevation.

Scope

The scope of the (preliminary) analysis included the following:

1. Compute the water surface profiles for North Buffalo Creek from the Wendover Avenue crossing downstream to the North Elm Street Bridge.

- HEC-RAS 3.0 was used as the hydraulic model for computing the water surface profiles.
- Geometric data for the model was obtained through from the City's stormwater conveyance inventory and cross section data, 2000 aerial photography, 1995 topographic information, and bridge inspection reports for Elm Street and Cridland Road.
- Flow data for the model was obtained from the HEC-2 models of the FEMA FIS of the mid-1980's for all flows except the 2-year. The 2-year flow was estimated based on the FEMA flows. It was decided that the characteristics of the

watershed upstream of the study area had not changed radically since the effective FEMA study and was acceptable to use these flows.

2. Map the extent of flooding (existing conditions) of the 10-year and 100-year storm on the 1995 (most current at time of preliminary study) topography map.

3. Review options for reducing flooding (hazards) in the area. After a field investigation, it was decided that feasible options may be to remove the solid hand rails of the Elm Street and Cridland bridges, add flanking culverts at the Elm Street bridge, or replace the aging bridges with ones that have a larger opening size for the creek and flood flows.

Analysis

Models were to run of the (1) existing condition, (2) removal of the solid handrails at Elm Street and Cridland Road bridges, and (3) removal of the handrails plus adding flanking culverts at Elm Street bridge.

Existing Conditions Run: In general, the existing condition model shows that the difference between the water surface elevations (from the starting point of the study area to the end point) is less than the original FEMA models. For example, the FEMA study indicates that from STA. 60834 to 64424 there is a difference of approximately 3 feet in the 100-year event. With the new model the difference is approximately 1.5 feet. This difference may be a result of the new modeling software and more accurate Manning's "n" values (roughness of the stream cross section and floodplain) and cross sectional information. (A model run was made with the original "n" values used in the FEMA study for this area and a 2.1 foot difference was determined between the starting point and ending point for the 100-year elevation).
The 10-year and 100-year flood profiles were used to plot the floodplain in the Latham Park Area. There appears to be at least 5 structures in the 10-year floodplain and 28 structures in the 100-year floodplain, based on this analysis.

Removal of Handrails Run: A run was made removing the solid handrails on both the Elm Street and Cridland Road bridges. The model indicated that removing these handrails provide little reduction in the flood elevations as compared to the existing conditions run. The 50-year profile shows a constant difference of 0.3 feet from the Elm Street Bridge to the upstream end of the study area. The 10-year profile shows a reduction of 0.2 feet upstream of the Cridland Road bridge. There is negligible change in the other profiles.

Removal of Handrails Plus Relief Culverts at Elm Street Bridge Run: A run was made with adding flanking culverts (two 96" culverts and two 72" culverts) under Elm Street. The run also included removing the solid handrails on both bridges. The maximum reduction (from the existing model run) was in the 50-year profile. A 0.5 foot reduction was calculated from the Elm Street Bridge to the upstream end of the study area. The 100-year showed a 0.25 foot reduction from the Elm Street Bridge to the upstream end of the study area and the 10-year profile showed a 0.25 foot reduction upstream of the Cridland Road Bridge.

Conclusions

The feasible structural changes to the two bridges in this study area seem to provide little difference in the resulting predicted flood elevations. After examining the normal depth profiles, it appears that downstream backwater (in North Buffalo Creek) is a major controlling factor in flood elevations in this area, therefore (any potential) engineered solutions need to be evaluated when modeling the entire (North Buffalo Creek) watershed and creek system. Acquisition, floodproofing, or retrofits may be an option for those individual structures that experience periodic flooding, if such measures were consistent with controlling City policy and City Council direction and per available funding. Flood mitigation measures relative individual structures and property may also require the support of a federal and/or state floodplain mitigation grant for Greensboro.